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ARS 91-61
April 1967

U. S. DEPARTMENT OF AGRICULTURE
NATIONAL PEST CONTROL SERVICE

1967 20 1967

OFFICE OF PEST CONTROL

QUESTIONS AND ANSWERS ON KEEPING SCREWORMS OUT OF THE UNITED STATES

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service

Animal Health Division
Agricultural Research Service
United States Department of Agriculture
Federal Center Building
Hyattsville, Md., 20782

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This publication supersedes ARS 91-38, Questions and Answers About Screwworm
Eradication, issued November 1962.

QUESTIONS AND ANSWERS ON KEEPING SCREWWORMS OUT OF THE UNITED STATES

NATURE AND HABITS OF SCREWWORMS

What is the screwworm? The screwworm is an injurious parasite of livestock and other warmblooded animals, including pets, and even human beings. It is the maggot, or larva, of the screwworm fly with the scientific name, Cochliomyia hominivorax (Coquerel). It has been given the descriptive name "screwworm" because the taper of the larva's body and the rings of spines that encircle it somewhat resemble a wood screw. It is very difficult to distinguish from other blowfly maggots.

What does the screwworm fly look like? It is about three times the size of a housefly. It has a bluish-green body with three dark stripes along the back and an orange-colored head. The fly is rarely observed, except around animal wounds, and is difficult to distinguish from some of the other blowflies.

What is the life cycle of the screwworm? The time required for development--from egg, to larva, to fly--averages about 3 weeks. Flies can mate when they are 2 days old, and females usually mate just one time. Females can lay their first egg mass at about 6 days of age. Individual females on rare occasions can lay up to 3,000 eggs during their lifetime--usually in clusters of 250 to 400 eggs--at 4 to 6 day intervals. Tiny, barely visible larvae hatch from the eggs within a day. The larvae, in clusters, bury themselves almost full length in the wounds on animals and feed for 5 to 6 days. They are then full grown and about 1/2 inch long. The fully developed larvae drop to the ground and enter the soil where they are transformed into pupae. During warm weather, flies emerge from the pupal cases in about a week. In colder weather, they may not emerge for 60 days or more.

What losses are caused by screwworms? Before screwworms were eradicated, they caused about \$20 million loss each year in the Southeast and up to \$100 million a year in the Southwest. A substantial part of these losses was due to the need for frequent examination and treatment of animals. Losses now occur only in the Southwest and are negligible.

DAMAGE CAUSED BY SCREWWORMS

What is the effect of a screwworm attack on animals? If untreated, screwworm-infested wounds may often result in death of the animal. Surviving animals may be maimed or stunted, make slow weight gains, and be more susceptible to other diseases than healthy animals.

What attracts the flies to animals they infest? Flies are attracted to wounds such as navels of newborn animals, wire cuts, scratches, snags, surgical operations, brands, dog bites, fly and tick bites, wounds from fighting, punctures in the udders of sows made by the needlelike teeth of suckling pigs, ear-marking, ear-tagging, and ringing of hogs. Navels of newborn animals appear to be the most attractive to the fly, and navel infestations are more likely to cause death than the others listed. Infested wounds are even more attractive to screwworm flies than fresh wounds.

Why is weather a factor in screwworm losses? Extremely high or low temperatures and drought are unfavorable for the development of screwworms and thus tend to hold down losses. Following a mild, moist winter when conditions are favorable for screwworm activity,

screwworm fly populations are high and animal losses are usually heavier and extend over a much greater area than losses following a cold winter. The danger of reinfestation increases in freed areas whenever weather conditions in nearby infested areas are favorable to population buildup and migration of screwworms.

OCCURRENCE AND SPREAD OF SCREWWORMS

Where do screwworms occur? Screwworms are native to Mexico, Central America, South America, and certain West Indies islands as well as the United States.

Screwworms were first reported in the Southwestern United States in 1825 and migrated from there seasonally to other parts of the country. Before 1933, screwworms could be found during the warm months of the year as far east as Mississippi and north to South Dakota. In 1933, they were accidentally introduced into southern Georgia through movements of infested animals and subsequently spread into Florida where they overwintered, became established, and caused heavy losses.

After the sterile fly technique was developed, an eradication program was started in the Southeastern United States in 1957 with the cooperation of the U.S. Department of Agriculture, the affected States, and the livestock producers. The pest was eliminated from the Southeast in 1959. Eradication of screwworms was started in the Southwest in 1962, with the sharing of costs by the affected States, USDA, and livestock producers' organizations. By 1966, established populations of screwworms had been eliminated from the continental United States. Since then there have been sporadic outbreaks in the Southwest caused by flies migrating from Mexico. As long as the barrier is located along the common U.S.-Mexico border, such outbreaks will continue to occur. Because of the ability of the screwworm to overwinter in parts of the Southwest, the pest could become re-established in the United States if prompt action is not taken to find, report, and eliminate such recurring infestations.

How do screwworms spread? They spread by natural migration and activity of the flies and by means of infested animals moving about or being shipped from place to place.

How far can screwworm flies travel under their own power? In trapping studies, a single female from a batch of irradiated and marked screwworm flies was recovered 180 miles from where it was released. Epidemiological evidence accumulated during the Southwest eradication program indicates that screwworm flies may be able to migrate up to 300 miles under their own power.

How many hosts do screwworms have? All warmblooded animals, both domestic and wild, are potential hosts for screwworms.

THE STERILE FLY BARRIER AGAINST MIGRATING SCREWWORMS

Is there a natural barrier to screwworm migration along the U.S.-Mexico border? No. Unless kept out by an artificial barrier, screwworms will re-invade the United States and re-establish populations in this country.

How are screwworm flies retarded from entering the United States? An artificial barrier is provided by the regular release of sterile flies along the U.S.-Mexico border from the Gulf of Mexico to the Pacific Ocean.

How does the release of sterile flies provide an artificial barrier to the screw-worm? This technique is based on greatly outnumbering native male flies in the barrier with the release of large numbers of sexually sterile males. The female fly rarely mates more than once and, when mated with a sexually sterile male, she lays eggs which will not hatch. This technique destroys the reproductive cycle of native flies and keeps the population of fertile flies in the barrier at a very low level.

If sufficient quantities of sterile males continue to be released throughout the barrier zone, they will reduce and hold the population of screwworms in the zone to such a low level that successive migrations of screwworm flies are prevented from penetrating the barrier into the United States.

Where are sterile screwworm flies released? Sterile flies are currently being released in a strategic pattern in the sterile fly barrier and in areas of the Southwestern United States where outbreaks are reported. The pattern for strategic release of sterile flies is based on scientific studies of the habits and distribution of the pest and reports of infestations.

Within the barrier zone, intensive fly drops are made over those areas where screwworm populations need to be eliminated to prevent their spread into freed areas.

When an outbreak occurs, the immediate area is "hotspotted" (subjected to the release of large numbers of sterile flies) and the livestock are sprayed with Co-Ral--an organophosphate larvacide--in order to eliminate the pests before they can become established and spread to other areas.

What is the width of the artificial barrier? The barrier ranges from 300 to 500 miles in depth and extends from the Gulf of Mexico to the Pacific Ocean along the U.S.-Mexico border.

Are sterile flies being dropped over Mexico? Yes. During the year, approximately three-fourths of the sterile flies produced are released over the Mexican portion of the barrier zone. This penetration into Mexico is designed to "push" native Mexican screwworm flies further away from the freed areas in the United States.

Are infested wildlife a threat to the barrier zone? They do not ordinarily create a serious hazard to the security of the barrier zone. Wild animals generally do not migrate great distances and furthermore, the smaller animals such as field mice will not support an infestation until the larvae mature and drop out of the wound.

What is the cost of maintaining the U.S.-Mexico sterile fly barrier zone? The cost of maintaining the sterile fly barrier zone is about \$5 million a year.

Who finances the operation of the barrier zone? As established self-perpetuating screwworm populations were eliminated from the United States in 1966, the Federal Government has assumed the cost of producing and releasing flies in the barrier zone.

Who finances the eradication of infestations north of the barrier zone? Each State shares the cost equally with USDA to eliminate any outbreaks occurring within its borders north of the barrier.

Who is cooperating with the USDA in this program? Livestock producers, agricultural officials of the States adjacent to Mexico, and the Republic of Mexico have cooperated with USDA by providing information about screwworms infesting the border area and are continuing to assist in control activities. Cooperation of individual livestock producers on both sides of the border, particularly with regard to reporting suspected infestations, is a key factor in the success of barrier operations.

Can the release of sterile flies alone keep the pest from re-establishing in the United States? Yes. Theoretically this release of sterile flies alone would keep the pest eradicated, but the numbers of sterile flies needed would be so great that the cost of the program would be prohibitive. To prevent re-establishment of the pest, five major preventive measures must be employed: (1) Frequent inspection of livestock by the stockman, and submission of larval samples for identification; (2) an injury and wound preventive management program with precautionary treatment such as EQ 335 or Smear 62 applied to all unavoidable wounds; (3) prohibition of the movement of infested animals; (4) systematic and strategic sterile fly release; (5) an information program to keep livestock producers informed of the status of the program and of measures they should take to support the program.

Are Mexican livestock inspected before entry into the United States? Mexican livestock presented for entry into the United States are individually inspected by experienced USDA personnel. Animals with large or infested wounds are denied entry into the United States. USDA also operates patrols to prevent animals from straying back and forth across the border.

Why is prompt reporting of suspected screwworm infestations essential? It is necessary to find new infestations promptly so that immediate action may be taken to eliminate any outbreak before it becomes an established population which threatens the freed areas. State Departments of Agriculture, Extension Service, Vocational Agricultural Teachers, press, radio, and television--all contributed to the success of the program.

Does the Southwest's defense against the screwworm benefit other areas? Yes. If screwworms were permitted to become re-established in the Southwest, they would spread north and east and eventually become re-established throughout the entire Southern United States including those areas in the Southeast that have also been freed of the pest.

THE STERILE FLY PRODUCTION PLANT

Where are the sterile screwworm flies being produced? The plant producing sterile flies is located at Mission, Tex. The average production is about 115 million flies a week.

How are screwworms reared? Screwworms are reared in a food mixture heated to approximate an animal's body temperature. Meats such as ground bovine or swine lung, and horse meat, plus a small amount of preservative, are used to rear the larvae. As the larvae mature, they crawl from the mixture and are placed in sawdust where they enter the pupal (cocoonlike) stage.

When are the screwworm pupae exposed to the radioactive material for sterilization? This exposure is made 5 1/2 days after they enter the pupal stage.

How long are they exposed? They are exposed to gamma rays from Cobalt 60 long enough to receive a dose of approximately 8,000 roentgens. The usual exposure time is about 11 minutes.

Will the flies be sterile when they emerge from their pupal cases? Yes. They are sexually sterilized in the pupal stage and packed in cartons. They emerge from the pupal cases as flies a day or so after exposure to the gamma rays.

Are the flies then radioactive? Definitely not. No more so than a person who has been X-rayed.

How are the sterile flies released in the barrier zone? The pupae are packaged in cardboard cartons in which the flies emerge. The cartons are dispersed systematically over infested areas from airplanes. These planes are equipped with a special mechanism to open and release the cartons automatically at predetermined intervals.

SCREWWORM RESEARCH

What about research in the screwworm program? Development of the sterile-fly technique for screwworm eradication is a brilliant example of research contribution to insect control and an outstanding example of the peaceful use of atomic energy. This ARS-developed technique was successfully used in combination with traditional pest-control measures to eradicate screwworms from the United States--and its use will be continued along the border to prevent the pest from becoming re-established here.

Meanwhile the search continues for new ways to refine present eradication techniques and to develop better ones. For example, ARS scientists are looking for specific attractants that will provide a more efficient way of trapping flies to determine the location and abundance of screwworm flies. They are also investigating use of chemosterilants--perhaps in combination with attractants--to sterilize flies in the field. This could eliminate the necessity for the production, irradiation, and release of large numbers of flies.

Current research also includes-- studies of screwworms and how they behave in nature to help in the strategic release of sterile males; nutrition studies to further reduce the costs of feeding billions of artificially reared screwworms and to produce flies with maximum vigor; and selection and breeding studies aimed at developing hardier and more aggressive males.

LOOKING AHEAD

Have we adopted a set of permanent plans and procedures for fighting the screwworm? Yes. However, the plans and procedures to prevent re-establishment of the screwworm are purposely kept flexible. Operations are adjusted to fit changing circumstances and to take full advantage of new knowledge about screwworm eradication.

Why must a continuous defense be maintained against reinfestation of screwworms? Constant vigilance is the price of success in fighting all diseases. In the case of screwworms, a special reinfestation hazard exists because the pest is still established in Mexico and there is no natural barrier to prevent screwworm flies from migrating into the United States.

A continuous defense must be maintained to prevent re-entry and re-establishment of screwworms, which will again cause the damaging effects of screwworm infestations to our livestock industry.

How long will the U.S.-Mexico border barrier have to be maintained? As long as there are screwworms in northern Mexico it will be necessary to maintain the artificial barrier along the international border if the United States is to be protected against re-establishment of the parasite.

A cooperative Mexico-U.S. survey to determine the feasibility of a screwworm eradication program throughout Mexico has been completed. One result of such a program would be elimination of the need to maintain the present barrier along the U.S.-Mexico border.

How can livestock producers help? (1) Examine animals regularly for any scratch, cut, or open wound. (2) Manage livestock in a way that prevents injuries and avoids wounds from handling, surgery, birth, or other causes. (3) Collect maggots or egg masses that may be present in wounds, place them in alcohol or water, and give them to the county agent, livestock inspector, or veterinarian for positive identification. (4) Treat wounds with EQ 335, Smear 62, or coumaphos or ronnel formulations labeled for this purpose. (5) Apply approved preventive sprays, following directions provided on manufacturer's label. (6) Closely observe restrictions on animal movement. (7) Make sure that animals are free from screwworms when they are loaded at point of origin. It is illegal to move screwworm infested animals from one State to another. (8) Cooperate with neighbors; encourage them to follow the above procedures.

Pesticides used improperly can be injurious to men and animals. Use them only when needed and handle them with care. Follow the directions and heed all precautions on the labels.



Use Pesticides Safely
FOLLOW THE LABEL

U.S. DEPARTMENT OF AGRICULTURE